to the living matter in the psychical areas of the brain, these react on the cerebral centre or centres for speech, and, in turn, these "play upon the nuclei of the nerves supplying the muscles of the vocal apparatus."

In supporting this thesis Major Macnamara shows a wide acquaintance with contemporary biology—indeed, to such an extent is this the case that the book can well be recommended as an introduction to this department of science. The only criticism that may be offered is that there is rather a redundancy of statement, and not infrequently an exposition of matters that are not quite pertinent to the subject in hand. As examples we may take the references to current speculations in physics, to Ehrlich's chain-theory, to the description of karyokinetic phenomena and the changes in the early ovum, and to the exposition of new and abstruse notions about reflex activity. No doubt the author has desired to take a wide and philosophic view of the whole subject, even at the risk of introducing matter somewhat irrelevant. Still, conciseness is a virtue worthy of cultivation. This is an excellent additional volume to the "International Scientific Series." The illustrations have been carefully chosen, and there is a good index.

J. G. M.

Exercising in Bed. By Sanford Bennett. Pp. 268. (San Francisco: The Edward Hilton Co., 1907.) Price 1.25 dollars.

IN the introduction to this book, the author explains that he had been a delicate child and had led a sedentary office life, so that at the age of fifty he was dyspeptic, his muscular system was flabby, he was prematurely old! By adopting the system of exercises detailed in the book, he claims that at sixty-seven he is a strong, healthy man, and has regained youthful vigour, and certainly the photographs reproduced illustrating his condition before and after treatment show a very marked contrast.

The author is an enthusiast, but the book is written in a moderate spirit which disposes to the acceptation of his views. He rightly claims that the functions of the body can only be carried on if they be used and exercised. Thus a gland or muscle condemned to inactivity atrophies; it is a physiological law that a certain degree of activity is necessary for the physiological integrity of an organ or tissue. In consequence various methods of physical culture are much in vogue, and are of considerable service in the development of the body and preservation of health, but tend to be unpopular owing to the time necessary to devote to them, and the individual who loves his bed cannot, or will not, rise early enough to carry them out. Mr. Bennett, however, declares that all the necessary exercises can be carried out while in bed, and we think he is right, and a quarter or half-hour may be well spent in healthy exercise without disturbing the ordinary routine. In some ways, in fact, the method has an advantage, as many muscles can be better exercised when lying than when standing, and in those who are getting on in years, perhaps with weak heart and diseased arteries, there is far less likelihood of over-strain. Combined with various movements, massage or rubbing of the muscles is advocated, and is very desirable.

A series of exercises is detailed in the book, illustrated in every case with photographs, by which the muscular system of all parts of the body may be exercised and developed, and most of them can be carried out without any extraneous apparatus. We have no doubt that the exercises suggested, if carried out, would be of considerable benefit, even if they did not actually rejuvenate or restore good looks, as the author claims.

R. T. H.

Cement Laboratory Manual. By Prof. L. A. Waterbury. Pp. vii+122. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd., 1908.) Price 4*s.* 6*d.* net.

THIS is a book for the use of students who are learning the various physical methods of testing cement. In the main it consists of instructions for working out a series of "problems" by the learner during a course of laboratory tuition, as practised in the University of Illinois. The work is arranged much on the lines familiar to students of electricity at Finsbury under the late Prof. Ayrton, the operators working in classes with given apparatus and materials, and being furnished with directions how to carry out the experiments, how to record the results, and how to interpret them.

For comparison of the results with what would be required in actual practice two useful appendices are given. One contains the report of a committee of the American Society of Civil Engineers on the question of uniform tests for cement; the other is a report upon standard specifications for cement, by a committee of the American Society for Testing Materials.

Determinations of the degree of fineness, specific gravity, plasticity, soundness, time of setting, and tensile strength of cements are the chief experiments set out. These are regarded as suitable for class teaching, and a student who works carefully through the exercises should gain considerable insight into what is required in judging the values of cements by laboratory tests. The author, however, rightly points out that a considerable amount of practice, much more than is afforded by the laboratory course, is necessary to obtain uniformly satisfactory results.

Theoretical matters are not dealt with in the book. There are illustrations of the chief pieces of apparatus, and also some trivial pictures—a mason's trowel, a set of scales and weights, and similar things—which are a mere waste of space.

C. S.

"Saint" Gilbert: the Story of Gilbert White and Selborne. By J. C. Wright. Pp. 90. (London: Elliot Stock, n.d.) Price 2*s.* 6*d.*

THIS little book bears a most unfortunate title, for whatever may have been the virtues of Gilbert White, he was in no proper sense of the word a saint. He was an honest, excellent Englishman, with a "curious" intellect and a generous disposition, but assuredly not more saintly than a thousand others. Mr. Wright says in his preface that "it is permissible to regard him as the patron saint of the little village where he spent the greater part of his life." That is well enough, for it suggests no saintliness; but "Saint Gilbert" is most unhappy. The book consists of 85 small pages, largely made up of quotations from White himself and those who have recently written about him. It will do no harm, and may perhaps do some good; and that is perhaps all that need be said about it. The eight photographs which illustrate it are unusually good, and so are the tail-pieces at the end of the chapters.

Les Zoocécidies des Plantes d'Europe et du Bassin de la Mediterranée. Tome i. By C. Houard. Pp. 569; 1365 figures, 2 plates, and 4 portraits. (Paris: Hermann, 1908.) Price for both volumes, 40 francs.

DR. HOUARD deserves congratulation on the successful accomplishment of his task of giving a systematic account of the European galls. Of recent years there has been great activity in the study of galls, which are of equal theoretical and practical interest, and this scholarly and well-arranged catalogue, brought up to date, will be widely welcomed. It is an admirable piece of work. The author gives terse descriptions of

the galls, and refers (by name simply) to the gall-forming animals; he arranges the galls according to the families of plants affected; he supplies more than a thousand serviceable illustrations, a statement of the geographical distribution of each gall, and the indispensable bibliographical references. The second volume is in the press; the first volume deals with the galls of cryptogams, gymnosperms, monocotyledons, and the dicotyledons from Ranunculaceæ to Rosaceæ. The work will be a great boon to entomologists, botanists, foresters, and agriculturists. We hope that the author will not write *finis* to his *magnum opus* without discussing, as he is so competent to do, the fascinating biological problems which are raised by the study of galls, crowning his work of description with an essay of interpretation.

Practical Coastal Navigation, including Simple Methods of finding Latitude, Longitude, and Deviation of Compass. By Comte de Miremont. Pp. 88. (London: J. D. Potter, 1908.) Price 4*s*.

IN this small volume Comte de Miremont has collected an enormous amount of useful information and what might be called tricks of the trade, which tell the young navigator everything that has been found useful in coastal navigation after years of experience.

The book is excellently arranged, and the explanations are simple. Besides the various chapters on actual coastal navigation, deviation and rule of the road, and weather forecasting in home waters, are most ably explained.

The book should find a place in every chart-house and navigation school. Comte de Miremont is to be highly congratulated on having produced such a useful aid to mariners, and to those wishing to become efficient in this particular art. H. C. LOCKYER.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Radiation of the Active Deposit from Radium through a Vacuum.

WHEN the radium emanation is transformed into radium A, the process is accompanied by the emission of α particles with a velocity of $1{\cdot}70 \times 10^9$ centimetres per second (Rutherford, *Phil. Mag.*, October, 1906). The portion of the atom from which the α particle has been emitted, which constitutes the radium A, must therefore be subjected to considerable shock and recoil in a direction opposite to that in which the α particle is projected. If we further consider that the mass of the α particle is $4(H=1)$, and that of the active deposit of the order 100, it follows that at the moment of its formation this product must be travelling with a velocity of the order 10^7 centimetres per second. In ordinary circumstances, when the emanation is mixed with air at atmospheric pressure, the radium A particle will possess only sufficient energy to permit it to travel a fraction of a millimetre before being stopped by collision with air molecules. On the other hand, at very low pressures, these particles should travel considerable distances without being stopped by the rarefied air, and come to rest on the enclosure containing the emanation. These particles should, in fact, constitute a type of very easily absorbed radiation. It has been the object of some experiments which we have recently performed to demonstrate directly the existence of this radiation.

The emanation from a fairly large quantity of radium was condensed at the bottom of a wide glass tube by immersing its end in liquid air. A brass plate, which just fitted into the glass tube, was suspended, in a high vacuum, a few centimetres above the condensed emanation so as to expose it to the bombardment of the active deposit particles being fired up the tube. After a suitable exposure the plate was removed, and its activity tested in the usual manner by a quadrant electrometer. The surface of the plate exposed to the emanation was always found to be highly radio-active.

Now this in itself would afford no evidence of the effect sought, for it is well known that when a large quantity of radium emanation is condensed in liquid air, the condensation is by no means complete, and there always exists in the vessel, above the condensed emanation, a considerable quantity of emanation in the gaseous state. A plate situated above the emanation as described above must therefore of necessity become radio-active on this account. But it was always found that the activity of the surface of the plate facing the emanation was greater than that of the opposite side, and it seems quite certain that this excess of activity is due to the direct radiation of the active deposit on to the plate. The ratio of the activity of the surface turned towards the emanation to that turned away from it has been found, under suitable conditions, to be as great as 50 to 1. The exact ratio obtained depends, of course, on a variety of experimental conditions, but in all circumstances the activity of the surface of the plate turned towards the emanation exceeded that of the reverse side. Moreover, by interposing a screen between the emanation and the plate, the excess activity collected on the surface of the plate turned towards the emanation could be completely obliterated. Experiments have been made at different pressures, and it has been found that the radiation is cut down to one-twelfth by traversing about 8 centimetres of air at a pressure of 1·15 millimetres of mercury. The same distance of air at 2 millimetres pressure is sufficient almost completely to stop the radiation.

These experiments give rise to a number of interesting questions which it is not yet possible to answer with any certainty. In the first place, it seems probable that when the emanation is condensed at the bottom of an evacuated tube, the attendant phenomena must be somewhat complicated, for when in radio-active equilibrium the emanation will be mixed with all its decomposition products. At every stage in the radio-active series at which α particles are expelled, some of the residual atoms should be fired up the tube. Although it is not yet possible to speak with certainty, it would seem that both radium A and radium B are projected up the tube on to the plate exposed to the radiation.

Another question of importance also arises as to whether the particles projected from the emanation are charged or not. Some experiments have already been made on this point with the object of deflecting the radiation by an electric field; but the difficulties are considerable, and no definite evidence has yet been obtained. We hope, however, that these difficulties will not prove insuperable.

S. RUSS
W. MAKOWER.
Physical Laboratory, The University, Manchester, January 9.

The Isothermal Layer of the Atmosphere.

IT seems to me that in NATURE of January 7 (p. 281) Mr. Dines successfully defends his simple, compact, but extremely efficient apparatus from the suspicions that have been levelled at it. The tests of the instrument before and after use show that it truly records the temperatures and pressures to which it is reduced. Mr. Dines is therefore entitled to call for adequate discussion of the most marked outcome of the experiments—the fact that in nearly all cases the minimum reading of temperature is reached long before the maximum height in the ascent, and long after in the descent. To suggest that the thermometer or the barometer may be slightly out is really to evade the problem.

Taking, then, the readings as fairly accurate, do they prove the "isothermal layer"? What are the circumstances? To the best of my knowledge they are these:—the instrument is screened by a polished metallic cylinder open at top and bottom, the centre of which it occupies, and the draught of air produced by the up-rush and down-rush of the balloon is relied on to ensure that the thermograph, which is of light metal strip, shall take the